

REMARKS

Applicants' attorney acknowledges with appreciation the telephone interview held with Examiner Lee on October 6, 2005. In accordance with that interview, and in response to the Office Action outstanding in this application, applicants have added a clarifying amendment to the specification, have cancelled claim 11, and have rewritten claims 10, 21, 25, 35 and 40. Reconsideration of the application in light of these changes and in view of the following comments is respectfully solicited.

This invention is directed to multilevel three-dimensional structures, which may include photonic crystals, optical couplers or the like, of arbitrary shape fabricated in layers on the surface of a substrate, with each layer being a lithographically definable material and with adjacent layers preferably being separated by photosensitive barrier layers or films. The shapes of the layers are lithographically defined and exposed individually as the layers are formed. After all layers have been deposited on the substrate, all are developed in a single step to produce the final solid structure. This final structure has a shape corresponding to the shapes of the stacked layers, with each layer producing a corresponding level of the final structure.

The structure of the invention may be defined and formed on a substrate integrally with semiconductor devices also on the substrate to produce a monolithic device such as an optical coupler for interconnecting the semiconductor devices on the substrate with each other or with external optical devices. The lithographically defined layers may be a polymer or a positive or negative photoresist material so that, for example, the monolithic device of the invention may be formed from the exposed portions of the layers of a negative photosensitive material or from the

unexposed portions of a positive photosensitive material to produce a three-dimensional optical structure having multiple vertically aligned levels, each of arbitrary shape, and at any desired location on the substrate.

In the Office Action, claim 35 was objected to for failure to use the term "consisting of." This claim has been amended in accordance with the suggested language.

Claim 40 has been rejected under 35 USC 102(e) as anticipated by Matsuura.

Independent claim 40 is directed to a photonic crystal structure having first and second adjacent, lithographically defined layers that are periodic in a direction parallel to each other. There is no teaching of such a feature in Matsuura, and accordingly the claim is clearly patentable. The reference to Matsuura et al. is directed to a method of producing a periodic laminate structure prepared by laminating photosensitive material layers with intermediate non-photosensitive layers. As taught in the patent and illustrated in Figs 26 and 27, a first photosensitive layer 31a is formed on a substrate 30 and is exposed to provide a patterned layer. A non-photosensitive layer 33a is coated on top of layer 31a, and then a second photosensitive layer 31b is formed and patterned. This process is repeated to form the desired laminated structure. The photosensitive layers are then developed, and etching steps are performed on each non-photosensitive layer (see paragraph 99) to form the final device. As illustrated in the reference, the adjacent layers in Figs. 26 and 27 are periodic in perpendicular directions, not in parallel directions, and accordingly the reference is distinct from the structure of the present invention as defined in claim 40. Therefore the claim is not rejectable under 35 USC 102.

As discussed in the course of the interview, claim 40 has been amended to more clearly state that the layers with parallel periodicity are adjacent each other, to

clearly define over the structure of Fig. 27 of the reference, where the periodicity of the layers alternates.

Claims 10 and 11 have been rejected under 35 USC 103 as unpatentable over the combined teachings of Matsuura and Clevenger, it being asserted that Clevenger teaches that the layers of Matsuura could be a conducting polymer.

Claim 10 has been rewritten to incorporate the subject matter of Claim 11, and the latter claim has been cancelled, but applicants reserve the right to resubmit the subject matter of Claim 10 in a continuing application.

It is respectfully submitted that there is no suggestion in either of the references that would support the rejection of claim 10 as amended . Matsuura specifically teaches the use of non-photosensitive barrier layers between adjacent photoresist layers, and Clevenger does not suggest that the barrier layer of Matsuura should be anything other than non-photosensitive. The barrier described in the claim is specified as being a photosensitive layer, and thus the references cannot render obvious the invention defined in claim 10.

Claims 11 and 19 were objected to in the Office Action for incorporating “new matter” in the recitation of barrier layers of photosensitive material. As discussed during the interview, the material set forth in the example at page 20 of the specification; namely, CEM365IS is inherently photosensitive. Accordingly, it is respectfully submitted that the specification clearly supports the language of the claims, and that the recitation of a photosensitive barrier layer is not new matter. To clarify this matter, the specification has been amended to specify that the described material is in fact photosensitive.

Claim 19 is, therefore, believed to be clearly allowable. Claim 11 has been incorporated in claim 10, thus making claim 10 also clearly allowable over the

references to Matsuura and Clevenger, either singly or in combination.

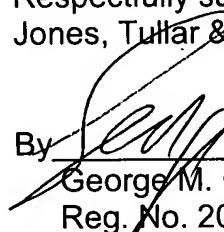
Allowed claim 25 has been amended for clarification, now specifying that "each" of the multiple layers is of a selected arbitrary shape. This was the intended meaning of the claim as allowed, but this amendment is believed to make the meaning clearer.

CONCLUSION

In view of the foregoing amendments and remarks, the present application is now believed to be in condition for allowance, and favorable reconsideration is requested.

Should the Examiner have any questions, he is requested to contact the undersigned.

Respectfully submitted,
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